

A Practical Protocol for Micropropagation of Ghazvini Pistachio Rootstock

(Pistacia vera cv. **Ghazvini**)

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Pistachio nut production is affected by several limiting factors among which the use of poor quality and non-uniform rootstock is of the great importance. *Using poor quality rootstocks has a long-term and determinant effect on pistachio production which are not easily appreciable for pistachio growers. Previous studies have shown that pistachio growth, yield, nut size, indehiscence, and blank nut production and also alternate bearing can be affected by the rootstock used. On the other hand, wide genetic variation of pistachio due to dioeciousness and wind pollination causes the pistachio nuts to be highly heterozygous and therefore using nuts for producing rootstock seedlings would be less desirable. Vegetative propagation in which the characteristics of mother plant can be safeguarded would be the best possible way for propagation. Micropropagation technique is one of the most efficient method for clonal propagation of desirable pistachio rootstocks and can be used to establish uniform and highly productive plantations as well as propagation of rootstocks resistance to soil-brown diseases and/or environmental stresses. In this method plant propagation is almost independent from seasonal restrictions and a large number of plants which are identical to mother plant can be produced in a short period of time and in a small space.*

Although several published reports have been concerned with micropropagation of pistachio (*P. vera*) or other *Pistacia* species, but there has been no attempt to quantify the process, to estimate the efficiency of the

eliminated by foliar applications of some zinc sulphate and boric acid, the yields will continue to be substandard. Under these circumstances, only a program of balanced fertilization including zinc sulphate and boric acid, will satisfy the invisible hunger and optimize production factors to obtain improved yield and quality while preventing the twigs from dying off. The results of this experiment indicate that the causes of dying off of the walnut, apple, citrus, and other fruit tree twigs are not the winter temperatures of a few degrees below zero or 55 above summer temperatures of Dezful but for example, that temperature is a secondary deficiencies especially of zinc and boron (primary factors) which lower the trees resistance, eventually result in the twigs and branches to die off.

In order to scientifically investigate the problem of dying twigs, walnut leaves from healthy trees and affected trees from such places as Shahmirzad of Semnan, Haydareh of Hamadan, and Dashtejozan of Malayer, Maragheh along with irrigation water were collected. The leaves were analyzed for all the macro and micronutrients, and irrigation water qualities were determined by standard procedures. Analysis results showed high concentrations of bicarbonates in irrigation waters (4-10 meq/L) indicating that the PH of the tree sap would be alkaline and along with the calcareous soils would result inadequate uptake or precipitation of micronutrients in the xylem's, or their slow and inadequate translocation to the leaves and nuts.

The analysis results showed that the zinc concentrations in the healthy samples collected from 300 hectares of orchards in Keshto Sanat in Shahmirzad of Semnan and orchards of Toyserkan and Dashtejouzan in Malayer and Maragheh were somewhat higher than those concentrations in the samples from the dying twigs (20mg/kg). The same was true for boron concentrations. The interesting observation was that the zinc concentrations in healthy samples were somewhat lower than those of the deficient samples in areas of high bicarbonated waters for the main reason that micronutrients especially zinc had precipitated or become inactive in the plant tissues because of bicarbonated irrigated waters. However this could be reserved, for example, the zinc concentration in the affected samples (dry twigs) from stunted orchards (Haydariyeh village) were much higher than those of the control samples because the trees had been sprayed once with solutions of urea and 0.5 boric acid and zinc sulphate each. In general the zinc and boron concentrations in the nonsaline areas were much lower than should have been for high yielding good quality walnut. Under these conditions, even if the twigs don't die off, the trees suffer from an invisible deficiency and hunger for zinc and boron, so that even if the causes of dying of the twigs are temporarily